

## A study on fish and fisheries of river W. Ramganga from Central Himalaya, India

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### ABSTRACT

Present study has been conducted on rain-fed river W. Ramganga from Central Himalaya, India. Paper deals with the fish and fisheries of the hill river W. Ramganga. The total 19 species of the fish biodiversity recorded belonging to 5 families and 8 genera, on the basis of economic importance fishes were divided into three groups, viz. major groups, minor groups, and other groups. The hill river was divided into 5 zones viz. 3 rhithron and 2 Potamon zone for fish catch.

**Key words:** Biodiversity, fish and fisheries, rhithron, potamon, species richness, fish catch composition

### 1. INTRODUCTION

The Central Himalaya is a region of an exceedingly diversified climate and veritable storehouse of natural aqua-resources including a number of Perennial River or streams, rivulets and lakes. Major population of Uttarakhand state lives in rural setting and falls below the poverty line. There hard and painful labour requires an energetic diet in order to maintain a normal health. Most of the holy rivers of India take their origin from the Himalayas and passes through various places in Uttarakhand region. Fortunately, the small streams, called Brooks or Gad or Gadhera, which contain the indigenous major, minor carps, loaches and catfishes etc., surround every village of this region. These fishes form an important source of protein rich diet for village folk. The W. Ramganga was rain-fed river has no detailed scientific information especially on the fish and fisheries. The present work deals with the fish diversity, species richness index and fish catch compositions, which is helpful for the management and development of indigenous fishery in the local streams of this region. Some noteworthy study has been done by Badola and Singh (1981), Dobriyal et al., (1992), rautela et al., (2005) and Pathak and Mudgal (2009).

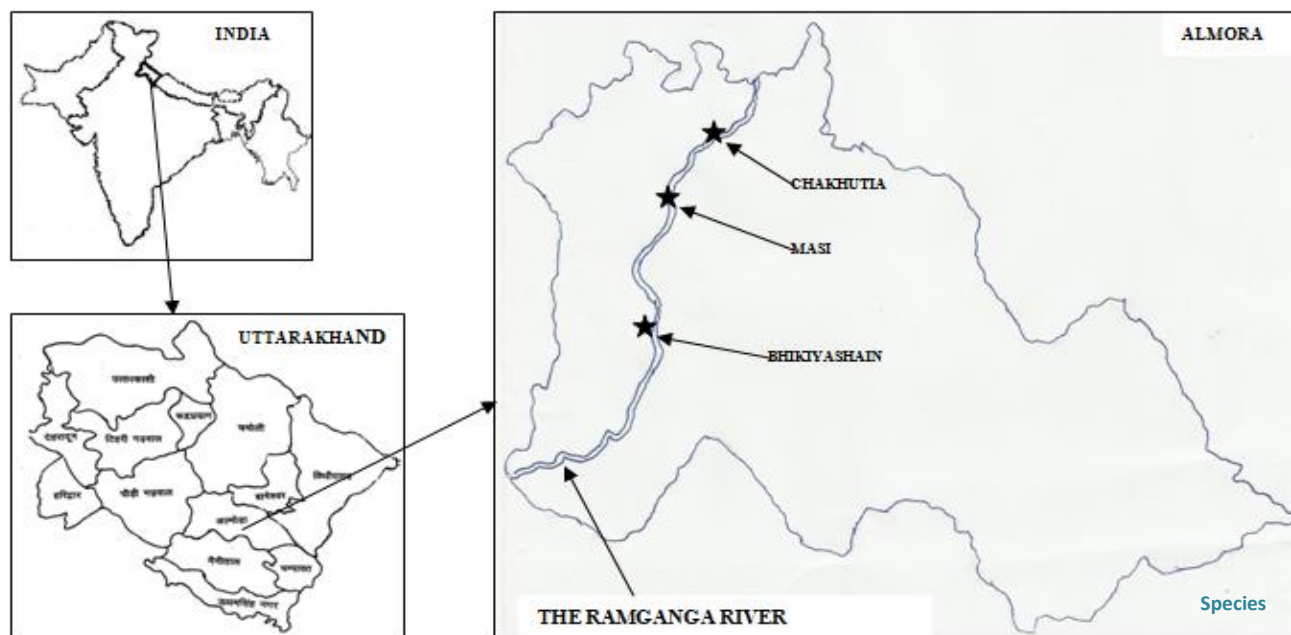
### 2. MATERIALS AND METHOD

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Map of the study area

The sampling was carried out in Uttarakhand state at five different spot they are Chaukhutia, masi, bhikiyasen, salt, ganai (Latitude: 29° 53' 55" N and Longitude: 79° 21' 22" E), annually between September 2009 to August 2012 for three years. The W. Ramganga was rain-fed river is the tributary of river Ram Ganga river system in the upland of Central Himalaya. Five sampling sites were selected in the water body viz. 3 at Rhithron and 2 at Potamon zones. Besides these personal collections, the fish were obtained from different catching centers along the rivers. Fishes were preserved into 5% formalin solution and identified with the help of keys provided by Day (1878), Talwar and Jhingran (1991) and Jayram (2002). The species richness index was calculated with the help of formula  $S^- = 2C/A+B$ , where  $S^-$  = species richness index,  $A$  = Total no. of individual species present in sampling site I<sup>st</sup>,  $B$  = Total no. of individual species present in sampling site II<sup>nd</sup>,  $C$  = common species present in both the sampling site. The estimation of fish catch composition at different zones was constantly observed in the first week of every month during the study period.

### 3. RESULT AND DISCUSSION

The total 19 species were recorded in the W. Ramganga. The 19 species of fishes noted belonged to 5 families and 8 genera. The maximum of 2 species in *Schizothorax* genera, 3 species in *Tor* genera, 4 species in *Barilius* genera, 5 species in *Noemacheilus* genera, 2 species in *Garra* genera, 1 species in *Mastacembelus*, *Pseudecheneis* and *Channa* genera respectively. The check list of Ichthyofauna along with family, name of species, local name, minimum size and maximum size is presented in the Table 1.

The commercially important fish species of rain-fed W. Ramganga were categorized according to their economic importance into major, minor and other categories. In the major categories *Schizothorax* genera, *Tor* genera and *Mastacembelus* genera; in minor categories *Barilius*, *Channa* and *Noemacheilus* genera and in other categories *Pseudecheneis* and *Garra* genera, were observed in W. Ramganga fish fauna. The presence of *Tor putitora* species increases during May to September since they migrate upwards for the purpose of breeding.

The status of presence and absence of Ichthyofauna diversity based on the Rhithron and Potamon zones of the W. Ramganga was presented in the Table 2. A maximum of 16 species were found in the sampling site III<sup>rd</sup> and a minimum of 6 species were observed in the 1<sup>st</sup> sampling site for Rhithron zone, but all most similar number of species i.e., 11 in IV<sup>th</sup> site and 10 in V<sup>th</sup> site were observed in the Potamon zone. Estimation of the species richness index for five sampling sites of fish fauna collection is presented in Table 3. The analysis of species richness showed for 3<sup>rd</sup> sampling site is more diversified than other sampling site.

The fish catch composition was estimated for each sampling site and average value for different fish species was calculated and is presented in Table 4 and Figure 1. The fish catch composition ranging up to 5% for *Garra* species and 58.8% for *Barilius* species in the sampling site I<sup>st</sup> was observed, In case of sampling site II<sup>nd</sup>, 39.10%, 25.40%, 19.30%

**Table 1**

List of Ichthyofauna diversity

S.No	Family	Name of Species	Min. Size (cm.)	Max. Size (cm.)	Occurrence	Local Name
1.	Cyprinidae	<i>Tor putitora</i> (Ham.)	10.3	45.6	Common	Kania.
		<i>Tor tor</i> (Ham.)	12.1	30.2	Common	Kania.
		<i>Tor chilooides</i> (Mc Cl.)	06.6	28.7	Common	Kania.
		<i>Schizothorax richardsonii</i> (Gray and Hard)	05.2	38.9	Abundant	Asale
		<i>Schizothorax plagiostomus</i> (Heckel)	08.7	42.6	Abundant	Asale
		<i>Barilius bendelisis</i> (Ham.)	04.3	11.9	Abundant	Kadchul
		<i>Barilius barna</i> (Ham.)	05.1	09.3	Common	Kadchul
		<i>Barilius vagra</i> (Ham.)	04.5	08.2	Rare	Kadchul
		<i>Barilius shacra</i> (Ham.)	-	05.7	Most Rare	Kadchul
		<i>Garra gotyla</i> (Gray)	03.9	17.9	Common	Gadale
		<i>Garra lamta</i> (Ham.)	04.1	15.7	Common	Gadale
2.	Cobitidae	<i>Noemacheilus rupicola</i> (Mc Cl.)	03.7	08.9	Abundant	Gadara
		<i>Noemacheilus montanus</i> (Mc Cl.)	03.9	09.1	Abundant	Gadara
		<i>Noemacheilus bevani</i> Gunter	05.9	07.4	Rare	Gadara
		<i>Noemacheilus denisoni</i> (Day)	06.1	07.9	Rare	Gadara
		<i>Noemacheilus savona</i> (Ham.)	07.1	08.1	Rare	Gadara
3.	Sisoridae	<i>Pseudecheneis sulcatus</i> (Mc Cl.)	8.0	17.3	Common	Kabadiyal
4.	Mastacembelidae	<i>Mastacembelus armatus</i> (Lacep.)	14.0	35.6	Common	Bam
5.	Ophiocephalidae	<i>Channa gachua</i> (Ham.)	-	13.9	Most Rare	-

**Table 2**

Ichthyofauna present and absent status based on Rhithron and Potamon zones

S.No.	Name of Species	Rhithron Zone			Potamon Zone	
		Site I	Site II	Site III	Site IV	Site V
1.	<i>Tor putitora</i> (Ham.)	-	-	+	+	+
2.	<i>Tor tor</i> (Ham.)	-	-	+	-	+
3.	<i>Tor chilooides</i> (Mc Cl.)	-	+	+	+	-
4.	<i>Schizothorax richardsonii</i> (Gray and Hard)	-	+	+	+	+
5.	<i>Schizothorax plagiostomus</i> (Heckel)	-	+	+	+	+
6.	<i>Barilius bendelisis</i> (Ham.)	+	+	+	+	+
7.	<i>Barilius barna</i> (Ham.)	+	+	+	-	-
8.	<i>Barilius vagra</i> (Ham.)	-	+	-	-	-
9.	<i>Barilius shacra</i> (Ham.)	-	-	+	-	-
10.	<i>Noemacheilus rupicola</i> (Mc Cl.)	+	+	+	+	-
11.	<i>Noemacheilus montanus</i> (Mc Cl.)	+	+	+	-	+
12.	<i>Noemacheilus bevani</i> Gunter	-	-	+	-	-
13.	<i>Noemacheilus denisoni</i> (Day)	+	+	-	+	-
14.	<i>Noemacheilus savona</i> (Ham.)	-	-	+	-	-
15.	<i>Garra gotyla</i> (Gray)	-	-	+	+	+
16.	<i>Garra lamta</i> (Ham.)	+	+	+	-	+
17.	<i>Pseudecheneis sulcatus</i> (Mc Cl.)	-	+	+	+	+
18.	<i>Mastacembelus armatus</i> (Lacep.)	-	+	+	+	+
19.	<i>Channa gachua</i> (Ham.)	-	-	-	+	-
20.	Total no of Present species in working sites.	6	12	16	11	10

**Table 3**

Estimations of species richness index for five sampling sites viz. three in Rhithron and two in Potamon zones

S.No	Sampling Site	Site I (Rhithron)	Site II (Rhithron)	Site III (Rhithron)	Site IV (Potamon)	Site V (Potamon)
1.	Site I (Rhithron)	-	0.667	0.625	0.352	0.375
2.	Site II (Rhithron)	-	-	0.714	0.695	0.636
3.	Site III (Rhithron)	-	-	-	0.667	0.769
4.	Site IV (Potamon)	-	-	-	-	0.736
5.	Site V (Potamon)	-	-	-	-	-

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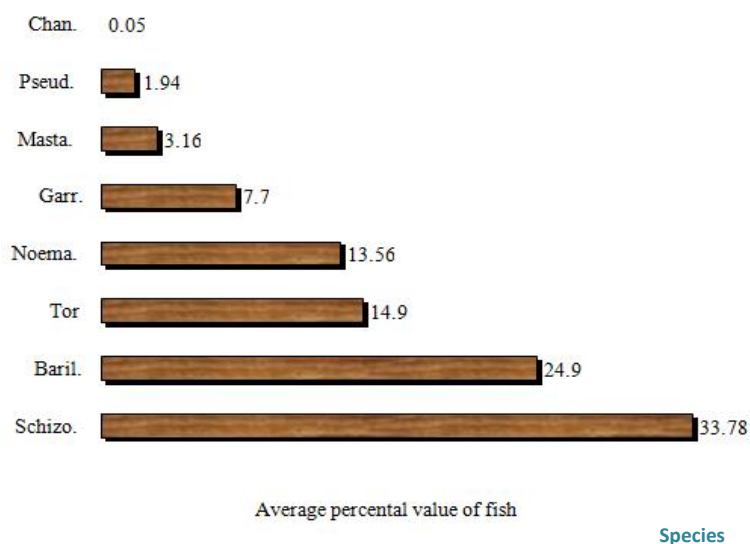
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**Table 4**

Fish catch composition for different sampling sites based on fish genera

Major Categories	I <sup>st</sup> sampling site	II <sup>nd</sup> sampling site	III <sup>rd</sup> sampling site	IV <sup>th</sup> sampling site	V <sup>th</sup> sampling site
<i>Schizothorax</i>	00.00	25.40	45.60	51.20	46.70
<i>Tor</i>	00.00	04.60	20.70	28.70	20.50
<i>Mastacembelus</i>	00.00	02.90	05.50	04.40	03.10
<b>Minor Categories</b>					
<i>Barilius</i>	58.80	39.10	10.20	06.50	09.90
<i>Noemacheilus</i>	36.20	19.30	06.50	03.00	02.80
<i>Channa</i>	00.00	00.00	00.00	00.05	00.00
<b>Other Categories</b>					
<i>Pseudecheneis</i>	00.00	03.70	01.30	01.20	04.30
<i>Garra</i>	05.00	05.70	10.00	04.10	12.70
<b>Percentage</b>	100.00	100.00	100.00	100.00	100.00



**Figure 1**

Average fluctuation in percentual value of the fish catch composition of different fish genera

and 2.90% were represented for *Barilius*, *Schizothorax*, *Noemacheilus* and *Mastacembelus* species respectively. In sampling site III<sup>rd</sup>, the highest 45.60% fish catch composition was found for *Schizothorax* and the lowest 1.30% fish catch composition was observed for *Pseudecheneis* species. For sampling site IV<sup>th</sup> a maximum of 51.20% fish catch composition and minimum 0.05% fish catch composition was observed and in the last sampling site (V<sup>th</sup>), 2.80% lowest fish catch composition and 46.7% highest was observed. Figure 1 shows that a maximum of 33.78% *Schizothorax* fishing was done by local villager. *Tor* species 14.90% fish catch composition was observed, where as 24.90%, 13.56%, 7.71%, 3.16%, 1.94% and 0.05% for *Barilius*, *Noemacheilus*, *Garra*, *Mastacembelus*, *Pseudecheneis* and *Channa* followed in decreasing order in River.

In the present study we concluded that the lower fish production found in sampling site I<sup>st</sup> and II<sup>nd</sup> (Rhithron zone) was due to the high water velocity, higher gradient, pebbly bottom and absence of epilithic phytobenthos algae and low population of Benthos. Present work indicated that Rhithron

zone 3<sup>rd</sup>; Potamon 4<sup>th</sup> and 5<sup>th</sup> zone was higher fish production zone for fish catch composition. Dobriyal and Singh (1987) opined that the low velocity, lesser gradient, pebbly bottom enriched with epilithic phytobenthos, and shallow pockets of lateral waters supported a varitable concept of filamentous algae and insect life providing suitable breeding ground for fish.

#### 4. CONCLUSION

Rain-fed nature of river W. Ramganga from Central Himalaya, has been categorized. Throughout the period of study 19 species of the fish were recorded belonging to 5 families and 8 genera and they were categorized as major groups, minor groups, and other groups. Ichthyofauna diversity observes to show presence and absence on the Rhithron and Potamon zones of the W. Ramganga in accordance to environmental condition. Ichthyofauna diversity also shows seasonal wise distribution as well. *Schizothorax* show highest catch composition whereas *Channa* lowest during study. Furthermore lower fish production observed in Rhithron zone whereas higher in Potamon zone.

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